SECTION 3

WATER SYSTEM DESIGN REQUIREMENTS

Original Ordinance Number: 00-09-16
Revisions: 02-09-98, 03-04-25

SECTION 3 – WATER SYSTEM DESIGN REQUIREMENTS

3.01 GENERAL: (Ordinance No. 02-09-98, 03-04-25)

A. Design criteria for all water systems shall comply with Texas Commission on Environmental Quality (TCEQ) Chapter 290 (Rules and Regulations for Public Water Systems), latest revision.

B. Railroad, State Highway and Tollroad crossings, etc., shall be as approved by the City Engineer. Permits to agencies other than the city must be submitted through the city.

C. The Engineer shall include on the design plans a summary of pipe sizes, pipe materials, and joint materials.

D. Profile elevations shall be provided for mains twelve-inch (12″) in diameter and larger. Eight-inch (8″) mains may be required to be profiled by the City Engineer.

E. Where applicable, line sizes shall comply with the Water Distribution System Master Plan or subsequent revisions.

F. Water mains shall be sized and extended through the limits of a development to serve adjacent properties. In phased construction of thoroughfares, the water main shall be extended the entire length of the thoroughfare being constructed.

G. Construction Staking - Line and grade stakes for construction of all water mains and services shall be furnished by the developer's Engineer or their designated representative. Property lines and corners must be properly staked to ensure correct alignment. The City will not be liable for improper alignment or delay of any kind caused by improper or inadequate surveys by the developer or by interference of other utilities.

3.02 WATER MAIN LOCATION: (Ordinance No. 02-09-98)

A. Water mains in right-of-way larger than twelve-inch (12″) shall be installed at least three feet (3′) from the back of curb, or otherwise as directed by the City Engineer.

B. Water mains in right-of-way are to be placed at a distance of two feet (2′) from the back of the curb, for six-inch (6″), eight-inch (8″) and twelve-inch (12″) lines.

C. Water mains in right-of-way near storm inlets shall be constructed behind the inlet by pulling the pipe using longitudinal bending in accordance with the manufacturer's requirements.

D. No water main shall be located nearer than four feet (4′) from any tree.

E. Water mains installed under creeks or ditches shall be protected by concrete encasement a minimum of ten feet (10′) past the toe of the embankment on each side or otherwise as directed by the City Engineer.

F. Water lines crossing under storm sewers and sanitary sewers shall have a minimum of eighteen inches (18″) clearance below storm sewers and twenty-four inches (24″) below sanitary sewer mains or otherwise as governed by TCEQ Chapter 290 requirements. Where minimum clearance cannot be achieved, water mains shall be encased six inches (6″) thick in concrete, ten feet (10′) either side of the utility crossing.

G. When water mains are installed parallel to sanitary sewers and manholes, there shall be at least nine feet (9′) of radial clearance outside to outside between the two, and the mains installed in separate trenches or otherwise as governed by TCEQ Chapter 290 requirements.

3.03 WATER MAIN SIZING:

A. SINGLE FAMILY RESIDENTIAL:

1. Twelve-inch (12″) mains will be required to adequately supply the development. Typically along collector streets and other areas as determined by the City Engineer.

2. Mains between two hundred feet (200′) and one thousand two hundred feet (1,200′) in length or mains supplying more than one (1) fire hydrant shall be an eight-inch (8″) nominal size.

3. Mains under two hundred feet (200′) in length or mains supplying one (1) fire hydrant with less than seven (7) lots may be a six-inch (6″) nominal size.

4. Dead end mains are not allowed except by City Engineer's approval.

5. For dead end mains allowed by City Engineer, the last two hundred feet (200′) shall be six-inch (6″) main serving less than seven (7) lots. A blow-off shall be installed for use by the Public Works Department.

B. MULTI-FAMILY RESIDENTIAL:

1. Mains over six hundred feet (600′) in length or mains supplying more than one (1) fire hydrant shall be twelve-inch (12″).

2. Minimum size in any Multi Family shall be eight-inch (8″). Water lines shall be extended to provide water to adjacent property as directed by the City Engineer.

3. Six-inch (6″) fire hydrant leads shall not exceed one hundred feet (100′).

4. Dead end mains are not allowed except by City Engineer's approval. If dead end mains are allowed, the developer shall install a blow-off for use by the Public Works Department.

C. COMMERCIAL, SCHOOLS AND MANUFACTURING:

1. Mains over one thousand feet (1000′) in length, or mains supplying more than two (2) fire hydrants shall be twelve-inch (12″). A fire service line shall be considered a fire hydrant.

2. Eight-inch (8″) mains may be used for fire hydrants located in parking lots not adjacent to buildings, but shall be looped.

3. Six-inch (6″) fire hydrant leads shall not exceed one hundred feet (100′).

4. Dead end mains are not allowed except by City Engineer's approval. If dead end mains are allowed, the developer shall install a blow-off for use by the Public Works Department.

3.04 WATER MAIN MATERIALS: (Ordinance No. 02-09-98)

A. Upon prior approval by the City Engineer, water mains twenty-four-inch (24″) in diameter and larger may be Reinforced Concrete Pretensioned Reinforcement (Steel Cylinder Type), complying with American Water Works Association Specifications C-303.

B. All water mains twenty-inch (20") in diameter and larger may be ductile iron with joints that provide a recession in the bell for the employment of a single rubber gasket to be placed before the insertion of the succeeding spigot. Minimum rated working pressure of the pipe shall be 300 psi for a twenty-inch (20") main and two hundred-fifty (250) psi for larger mains. All fittings shall be ductile iron of the mechanical joint type with a minimum rated working pressure of two hundred-fifty (250) psi.

1. Polyethylene encasement is required to be installed around the ductile iron pipe and related fittings and valves. This wrap shall be an eight (8) mil. thickness polytube. Seams and overlaps shall be wrapped and held in place by two-inch (2") wide plastic backed adhesive tape, Polyken 900 or Scotchrap no. 50, or an approved equal, with approximately two foot (2') laps on the polytube. The wrap on the barrel of the pipe shall be loose enough to allow the film to shift with the soil. The wrap shall be installed without breaks, tears, or holes in the film.

B. PVC mains over twelve-inch (12") shall be C905 DR18, twelve-inch (12") shall be C900 DR18 and four-inch (4") to eight-inch (8") mains shall be C900 DR14 with joints that provide a recession in the bell for the employment of a single rubber gasket to be placed before the insertion of the succeeding spigot. All fittings shall be ductile iron of the mechanical joint type with a minimum rated working pressure of 250 psi.

C. All mains to be installed under existing roadway must be installed by bore. Rust resistant steel casing minimum one-fourth-inch (1/4") thick shall be used with Raci patented casing spacers, or approved equal. No wood skids will be allowed.

D. All fittings shall be restrained with Mega-lug or approved equal fittings. Joint material for PVC shall conform to ASTM F471.

E. All valves, fittings, changes in elevation shall have concrete thrust blocks installed. Thrust blocking shall be minimum 3000 psi concrete and be able to withstand a minimum 200 psi test pressure.

F. All mains supplying fire sprinkler systems outside of utility easements shall be minimum 200 psi working pressure and U.L. listed.

G. Connections to an existing line shall be made with full body ductile iron tapping sleeve and valve. In order to maintain a manageable parts inventory and working knowledge of tapping sleeve and valves, the following tapping sleeves are approved: Mueller, American Flow Control and U.S. Pipe. With prior approval by the City Engineer, stainless steel Smith Blair 623 may be allowed for connection to existing lines twenty-inch (20") or larger.

3.05 VALVES: (Ordinance No. 02-09-98)

A. The location of valves larger than twelve-inch (12") will be as approved by the City Engineer.

B. Valves twelve-inch (12") and under shall be placed on or near street property lines not over six hundred feet (600') apart in residential, duplex and apartment districts and not over five hundred feet (500') apart in all other districts; and in such a manner as to require preferably two (2), but not more than three (3) valves to shut down each main segment, or as may be required to prevent shutting off more than one (1) fire hydrant. Valves twelve-inch (12") and under will be Resilient Seat Gate Valves (RSGV).

C. Sixteen-inch (16") and larger valves may be Butterfly Type. Manholes shall be constructed if required by the City Engineer or his/her designee.

D. On cross-feed mains without services, a maximum of four (4) valves shall be used to shut down each main segment.

E. Valves shall be placed at or near the ends of mains in such a manner that a shut down can be made for a future main extension without causing loss of service on the existing main. A minimum of twenty feet (20′) of main shall be installed past the valve to anchor it.

F. Where fire lines are connected to city water lines, valves shall be installed on each side of the connection and on the fire line.

G. Valve boxes shall be provided for buried valves. These boxes shall be three (3) piece screw type cast iron of the extension type and shall be similar to Mueller No. H-10360 or approved equal. The three (3) pieces shall consist of the top section, bottom section and cover.

H. Contractor shall pour a reinforced concrete block twenty-four-inch by twenty-four-inch by six-inch (24″ x 24″ x 6″) around all valve boxes so the finished grade is level with the finished parkway.

I. All valves shall be marked with a saw on the curb or pavement with a "V". The "V" shall point to the location of the valve as follows: If the valve is in the paving, the "V" shall be marked upright; if the valve is outside the paving, the "V" shall be marked upside down.

H. Valve boxes over four feet (4′) deep will require extensions, or otherwise as directed by the City Engineer. Valve box extensions shall be cast iron; PVC pipe is not allowed.

I. In order to maintain a manageable parts inventory and working knowledge of valves, the following valves are approved: Mueller, M&H and American Flow Control – one hundred-fifty (150) psi test.

3.06 DEPTH OF COVER:

The minimum cover to the top of the pipe must vary with the valve stem. In general, the minimum cover below the top of curb at street to top of the pipe should be as follows:

A. Lines larger than sixteen-inch (16″) shall have a minimum of six feet (6′) of cover which is sufficient to allow water and sewer and other utilities to go over the large main.

B. Sixteen-inch (16″) mains shall have a minimum cover of five feet (5′).

C. Twelve-inch (12″) and smaller mains shall have a minimum cover of four feet (4′).

D. For water lines to be constructed along county-type roads built with a high crown and bar ditches about the surrounding property increase the cover as required to allow for future paving grade changes.

3.07 WATER SERVICES: (Ordinance No. 02-09-98)

A service shall be installed from the main to a point two feet (2′) behind the curb line at a depth of twelve inches (12″), usually in advance of paving. After paving, the contractor shall furnish and install the meter box. The location of the meter box is at or near the center of the front of the lot to be served. No meter box shall be installed in a paved area. On multiple apartments and business properties, the desired size and location is usually specified by the owners or architect. Each service location will be marked on the curb with a single vertical saw mark by the contractor. Minimum requirements for water services:

A. Water meter boxes shall be provided for each service as per City Specifications.

B. Minimum one-inch (1″) meter and one-inch (1″) Type K copper services are required to serve all residential lots and patio homes. For townhomes and duplexes, a minimum three-quarter inch (3/4″) meter and service shall be provided to each of the family units.

C. The size of apartment, condominium, or multi-family services will depend on the number of units served with a minimum of one (1) meter per building.

D. Sand embedment shall be used around the pipe and corporation stop.

E. All service saddles shall be brass with double bronze flattened straps (no banded will be allowed) and shall be Ford, Cambridge, A.Y. McDonald, or approved other.

F. All service taps on existing water mains that are two-inch (2") or smaller should be made by the Public Works Department.

G. Twin meters in parallel are not permitted. Generally, a single larger meter shall be selected. Bullhead connections are not permitted.

H. Three-inch (3") and larger meters are required to be in a concrete vault.

I. A domestic service connection shall not be allowed on fire hydrant leads except as authorized by the City Engineer.

3.08 FIRE HYDRANTS: (Ordinance No. 02-09-98)

There shall be sufficient hydrants to concentrate the required fire flow, as recommended by the publication, "GUIDE FOR DETERMINATION OF REQUIRED FIRE FLOW" published by the Insurance Service Office around any building with no hose line exceeding the distances hereinafter established and with an adequate flow available from the water system to meet the required flow. In addition, the following guidelines shall be met or exceeded:

A. Residential and Nonresidential Property or Use:

1. Single Family Residential - As the property is developed, fire hydrants shall be located at all intersecting streets and at intermediate locations between intersections at a maximum spacing of five hundred feet (500') between fire hydrants as measured along the route that fire hose is laid by a fire vehicle.

2. Multi-Family Residential - As the property is developed, fire hydrants shall be located at all intersecting streets and at intermediate locations between intersections at a maximum spacing of four hundred feet (400') as measured along the length of the centerline of the roadway. The front of any structure at grade shall be no further than five hundred feet (500') from a minimum of two (2) fire hydrants as measured along the route that a fire hose is laid by a fire vehicle.

3. Other Districts - As the property is developed, fire hydrants shall be located at all intersecting streets and at intermediate locations between intersections at a maximum spacing of three hundred feet (300') as measured along the length of the centerline of the roadway. The front of any building at grade shall be no further than three hundred feet (300') from a minimum of two (2) fire hydrants as measured along the route that the fire hose is laid by a fire vehicle.

4. Protected Properties - Fire hydrants required to provide a supplemental water supply for automatic fire protection systems shall be within one hundred feet (100') of the Fire Department Connection for such system.

5. Buildings Fire Sprinkled - An eight-inch (8") fire line stub-out with valve shall be provided for all buildings to be sprinkled. A smaller stub-out can only be used with Fire Department approval. The City Fire Marshall shall approve the vault, fittings, valves and double detector check, etc.

6. Fire hydrants shall be installed along all fire lane areas as follows:

    a. Non-Residential Property or Use:

        (i) Within one hundred-fifty feet (150′) of the main entrance.

        (ii) Within one hundred feet (100′) of any Fire Department connection.

        (iii) At a maximum intermediate spacing of three hundred feet (300′) as measured along the length of the fire lane.

        (iv) Location of fire hydrants shall be outside radius of fire lanes and thirty-five feet (35′) clear of all buildings.

    b. Apartment, Townhouse, or Cluster Residential Property or Use:

        (i) Within one hundred feet (100′) of any Fire Department connection.

        (ii) At maximum intermediate spacing of four hundred feet (400′) as measured along the length of the fire lane.

        (iii) Location of fire hydrants shall be outside radius of fire lanes and thirty-five feet (35′) clear of all buildings.

7. In instances where access between the fire hydrant and the building, which it is intended to serve may be blocked, extra fire hydrants shall be provided to improve the fire protection. Railroads, divided thoroughfares, expressways, blocks which are subject to buildings restricting movement and other man made or natural obstacles are considered as barriers.

8. In undeveloped areas, fire hydrants shall be spaced every twelve hundred feet (1200′) or as designated by the City Engineer.

B. Restrictions:

1. In order to maintain a manageable parts inventory and working knowledge of fire hydrants, the following hydrants are approved: M&H and American Flow Control (Waterous), three-way standard thread with valve in lead no less than five and one-fourth-inch (5-1/4″) in size or approved other.

2. Fire hydrant leads shall have a bury depth of five feet (5′).

3. Valves shall be placed on all fire hydrant leads. It shall be a mechanical joint and flanged tee with a flanged end to mechanical joint gate valve so that the valve is anchored to the main.

4. Fire hydrants shall be installed so the breakaway point will be no less than two inches (2″), and no greater than six inches (6″) above the final grade elevation.

5. Fire hydrants shall be located a minimum of two feet (2′) and a maximum of six feet (6′) from the fire lane or roadway, based on the location of the sidewalk. The fire hydrant shall not be in the sidewalk.

6. All fire hydrants placed on private property shall be adequately protected by either curb stops or concrete posts or other methods as approved by the City Engineer and the Fire Department and shall be in easements. Such stops or posts shall be the responsibility of the landowner on which the said fire hydrant is placed.

7. All fire hydrants shall be installed so that the steamer connection will face the fire lane or street or as directed by the Fire Department and/or City Engineer.

8. Fire hydrants, when placed at intersections or access drives to parking lots, when practical, shall be placed so that no part of the fire truck will block the intersection or parking lot access when connections to the fire hydrant are made.

9. Fire hydrants required by this article and located on private property shall be accessible to the Fire Department at all times.

10. Fire hydrants shall be located at street or fire lane intersections, when feasible.

11. A Blue Stimsonite, Fire-Lite reflector model 88-SSA (or approved other) shall be placed just off center of the street or fire lane opposite fire hydrants. At intersections, reflectors shall be placed on both roadways opposite fire hydrant.

12. In non-residential developments an eight-inch (8″) lead will be required on all fire hydrants that are located more than one hundred feet (100′) from the looped main.

13. All fire hydrants are to be painted with two (2) coats of Tnemec Series 43-38H Diffused Aluminum, Silver Paint. When a color code other than Tnemec Series 43-38H Diffused Aluminum, Silver is required, the top bonnet including the lip and all nozzle caps shall be painted the appropriate color. See Table 3.1 below.

TABLE 3.1: Fire Hydrant Color
(Based on Main Size)

Water Main Size	Color
6″	Tnemec Series 43-38H Diffused Aluminum, Silver
8″	Tnemec Series 2H Hi-Build Tneme-Gloss, True Blue Safety
12″ & larger	Tnemec Series 2H Hi-Build Tneme-Gloss, Safety Yellow

C. Existing four-inch (4″) mains used for hydrant supply shall be replaced and dead-ends eliminated where practical. Six-inch (6″) lines shall be connected so that not more than one (1) hydrant will be between intersecting lines and not more than two (2) hydrants on an eight-inch (8″) main between intersecting lines.

3.09 WATER EASEMENTS: (Ordinance No. 02-09-98)

The following minimum width exclusive water easements are required when facilities are not located within public rights-of-way or easements:

A. Water mains are to be located within the center of a minimum fifteen-foot (15′) water easement.

B. Parallel easements and adjacent mains to right-of-way require approval by the City Engineer.

C. In residential developments, water mains shall not cross residential lots unless specifically approved by the City Engineer or his/her designee, in which case the easement shall be located within a single lot.

D. Fire hydrants located outside of public rights-of-way shall be encompassed by a ten-foot by ten-foot (10′ x 10′) water easement.

E. Two-inch (2″) and smaller meters serving multi-family residential and non-residential developments shall be set in a minimum five-foot by five-foot (5′ x 5′) water easement or in the right-of-way.

F. Three-inch (3″) and larger meters shall be in a minimum ten-foot by ten-foot (10′ x 10′) water easement and not in the right-of-way.